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Test report of

## IES LM-79-08

**Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products**

Rendered to:

ETI Solid State Lighting (Zhuhai) Ltd  
No.1, Zhongzhu Road South, Science & Technology Innovation  
Coast, High Tech District, Zhuhai City, Guangdong Prov., China

For products:

2x4 Luminaires for Ambient Lighting of Interior Commercial  
Spaces

Models No.:

559041###(##=11-30,#=0-9)

(Where ## can be 41-50 and 91-99 represent different client and sales districts.)

**Test Date:** Apr. 25, 2022

**Test Lab.:** **LCTECH Guangdong Testing Services Co., Ltd.**

2/F., Technology and Enterprise Development Center, Guangyuan Road, Xiaolan,  
Zhongshan, Guangdong, China

Tel: +86-760-22833366 E-mail: [Service@lccert.com](mailto:Service@lccert.com) <http://www.lccert.com>

**Test Sites:** 1/F., Building I, Technology and Enterprise Development Center, Guangyuan Road,  
Xiaolan, Zhongshan, Guangdong, China

**Template No.:** LC-RT-PL-092 Rev.1.1

**Test Note:** 559041110 was selected for the test.

**Complied by:**

Fish Tan

May 7, 2022

**Reviewed by:**

Lin Qiu

May 7, 2022

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## 1. General

### 1.1 Product Information

Brand Name	ETI, Silentaire, Cleanaire, NVC, Cleanaire Pro, Blue Halo
Factory 1	Name: ETI Solid State Lighting (Zhuhai) Ltd Address: No.1, Zhongzhu Road South, Science & Technology Innovation Coast, High Tech District, Zhuhai City, Guangdong Prov., China
Factory 2	Name: NVC VIETNAM TECHNOLOGY AND LIGHTING COMPANY LIMITED Address 1: Lot CN23-1, Yen Phong Industrial park, Dong Phong commune, Yen Phong district, Bac Ninh province VIETNAM Address 2: Lot CN9-6, Yen Phong Industrial park, Yen Trung commune Yen Phong district 16000 Vietnam
Category	Indoor
General Application	Troffer
Primary Use	2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces
Model Number	559041###(##=11-30,#=0-9)
Rated Inputs	AC120-277V,50/60Hz
Rated Power	Total power: 260W, lighting component: 55W
Rated Light output	6250lm
Declared CCT	3000K/3500K/4000K/5000K
Power Supply	ETI-AD06501400036DDA
LED Package, Array or Module	67-23ST Series, EVERLIGHT ELECTRONICS CO., LTD
Dimming	Continuous Dimming
Integral Controls	No
Controls Controllability	No
Receipt Samples	1 unit
Sample Code of lab.	220414104014
Date of Receipt Samples	Apr. 14, 2022
Note	The lighting component is selected for the test separately. This is a color tunable product, 3000K, 3500K, 4000K, 5000K settings are selected for the test.

## 1.2 Standards or methods

The following standards are partly or totally used or referenced for test:

No.	Name
ANSI/NEMA/ ANSLG C78.377- 2017	Specifications for the Chromaticity of Solid State Lighting Products
ANSI/IES TM-30-18 <sup>1</sup>	IES Method for Evaluating Light Source Color Rendition
ANSI C82.77-2002	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
CIE Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. No. 15:2004	Colorimetry
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products

Note:

1, For reference only and not in the scope of NVLAP.

## 1.3 Equipment list

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-987	APW-120N	2021-12-16	2022-12-15
AC Power supply	LC-I-989	APW-120N	2021-12-16	2022-12-15
Power analyzer	LC-I-PL-024	WT310E	2022-03-01	2023-02-28
Power analyzer	LC-I-954	WT210	2021-12-20	2022-12-19
Multimeter	LC-I-972	Fluke	2021-07-12	2022-07-11
Photometric colorimetric electric system <sup>2</sup> (2 meter sphere)	LC-I-956	HAAS-2000	Before use	Before use
Standard lamp <sup>3</sup>	LC-I-PL-030	D204C	2021-07-09	2022-07-08
Luminous Flux Standard Lamp <sup>4</sup>	LC-I-PL-027	24V/100W	2021-07-09	2022-07-08
Goniophotometer(with mirror)	LC-I-902	GMS2000	2022-04-21	2023-04-20
Wireless temperature transmitter	LC-I-PL-009	DWLR-DLR	2021-12-16	2022-12-15
Wireless temperature transmitter	LC-I-PL-008	DWLR-DLR	2021-12-16	2022-12-15

Note:

2, Bandwidth of spectroradiometer is 1 nm.

3, halogen lamp, 100W, omni-directional type, and its traceability to NIM.

4, halogen lamp, 100W, omni-directional type, and its traceability to NIM.

## 2. Test conducted and method

The luminaire was operated at least 2 hours to reach stabilization and temperature equilibrium before test.

### 2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at  $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ ; the air flow around the sample(s) being tested did not affect the performance.

### 2.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (60 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within  $\pm 0.2$  percent under load.

### 2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

### 2.4 Electrical Instrumentation

The calibration uncertainties of the instruments for AC voltage and current were less than 0.2 percent, and the calibration uncertainty of the AC power meter was less than 0.5 percent (95 % confidence interval,  $k=2$ ).

### 2.5 Color Measurement Method

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were calculated from these by software automatically.

### 2.6 Total Luminous Flux Measurement Method

Total luminous flux was measured by type C goniophotometer system.

Light intensity distribution was measured by a type C goniophotometer (with mirror) which can keep the sample in burn position when the tests conduct, and the total luminous flux was calculated from the intensity data by software automatically.

### 2.7 Luminous Intensity Distribution Measurement Method

Luminous intensity distribution was measured by a mirror-type goniophotometer (Type C) which can keep the sample in burn position when the tests conduct, and the kinds of graph were generated by software automatically.

### 2.8 Spatial Non-uniformity of Chromaticity

The customer did not require this measurement.

### 3. Test Result Summary

#### 3.1 Electrical data

Criteria Item	Result			
	3000K	3500K	4000K	5000K
Input Voltage & Frequency	120.00V ~60Hz	120.00V ~60Hz	119.99V ~60Hz	120.03V ~60Hz
Input Current(A)	0.466	0.458	0.451	0.452
Total Power(W)	54.95	54.10	53.23	53.45
Power Factor	0.984	0.984	0.984	0.985
I-THD	15.97%	15.55%	15.56%	15.21%

#### 3.2 Photometric data

Criteria Item	Result(Sphere)			
	3000K	3500K	4000K	5000K
Total Lumens(lm)	6438.83	6595.02	6722.89	6814.87
Luminaire Efficacy(lm/W)	117.18	121.90	126.30	127.50
Correlated Color Temperature (CCT)(K)	2944	3450	3904	5055
Color Rendering Index (CRI)	83.6	85.8	86.5	84.9
R <sub>9</sub>	10	20	23	14
R <sub>r</sub>	85	86	86	85
R <sub>g</sub>	98	97	96	95
R <sub>cs,h1</sub>	-11%	-11%	-10%	-11%
Chromaticity Coordinate (x,y)	0.4368, 0.3970	0.4041, 0.3816	0.3828, 0.3725	0.3440, 0.3555
Chromaticity Coordinate (u',v')	0.2536, 0.5185	0.2387, 0.5072	0.2284, 0.5000	0.2092, 0.4864
Duv	-0.0028	-0.0038	-0.0027	0.0024
Zone Lumens between 0-60°	77.37 %	-	-	-
Spacing Criteria (0-180)	1.28	-	-	-
Spacing Criteria (90-270)	1.28	-	-	-

#### 3.3 Color Rendering Details of 3000K

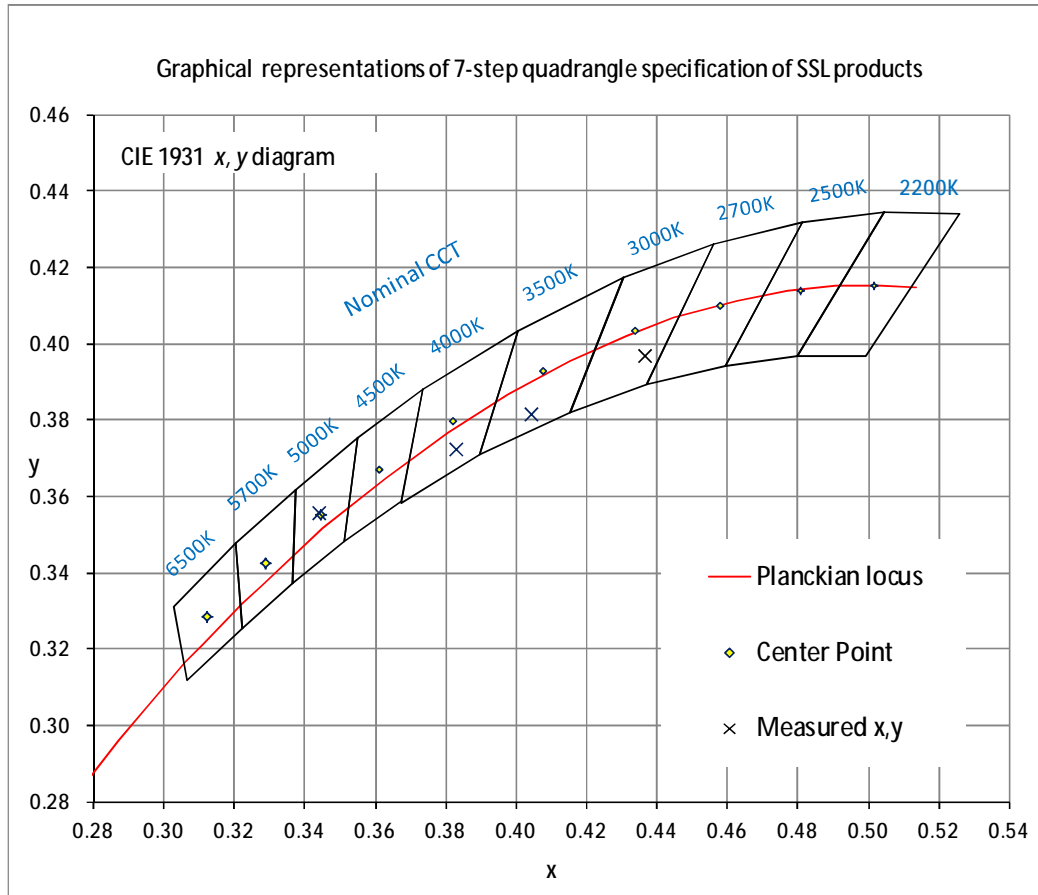
R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
83	92	95	82	84	91	82	59	10	83	83	77	85	98	75

#### 3.4 Electrical data on 277V of 3000K

Criteria Item	Result
Input Voltage & Frequency	276.99 V~60Hz
Power Factor	0.920
I-THD	18.01 %

## 4. Test Data

### 4.1 ANSI Chromaticity Quadrangles Diagram

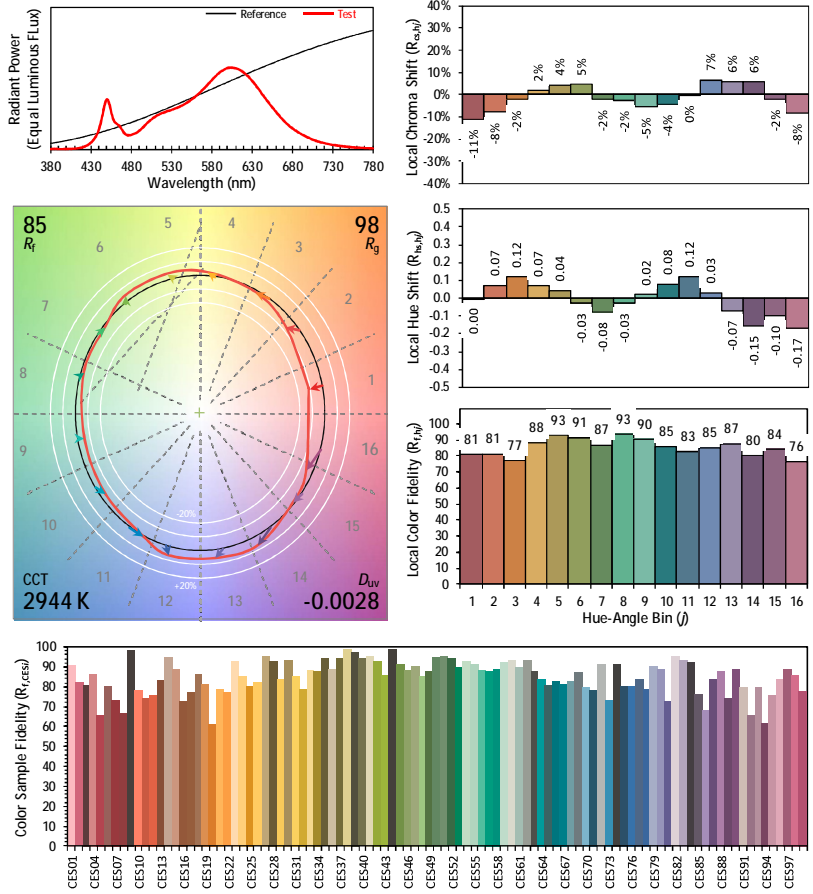


4.2 ANSI/IES TM-30-18 Color Rendition

ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD  
Date: 2022/5/7

Manufacturer: ETI Solid State Lighting (Zhuhai) Ltd  
Model: 559041110(3000K)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

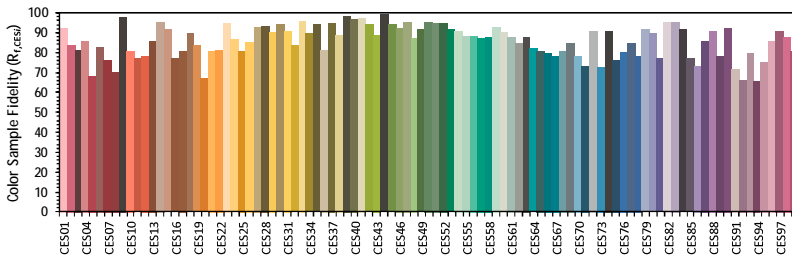
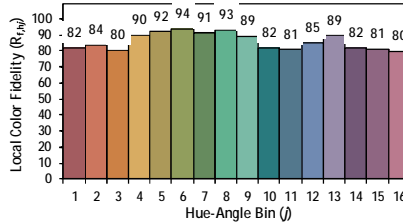
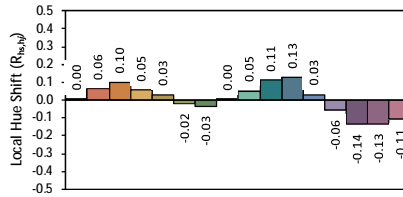
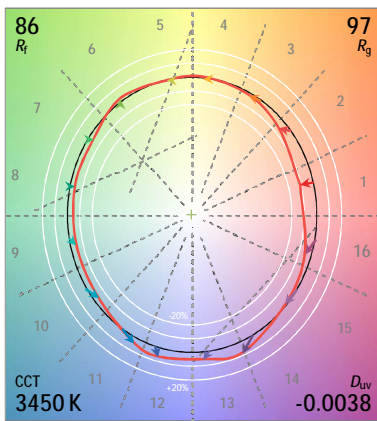
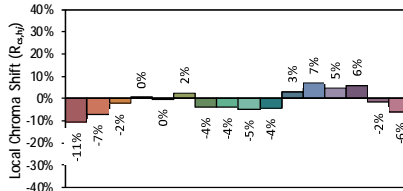
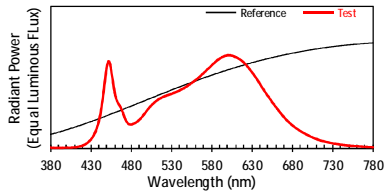
$x$  0.4368  
 $y$  0.3970  
 $u'$  0.2536  
 $v'$  0.5185



### ANSI/IES TM-30-18 Color Rendition Report

**Source:** User SPD  
**Date:** 2022/5/7

**Manufacturer:** ETI Solid State Lighting (Zhuhai) Ltd  
**Model:** 559041110(3500K)



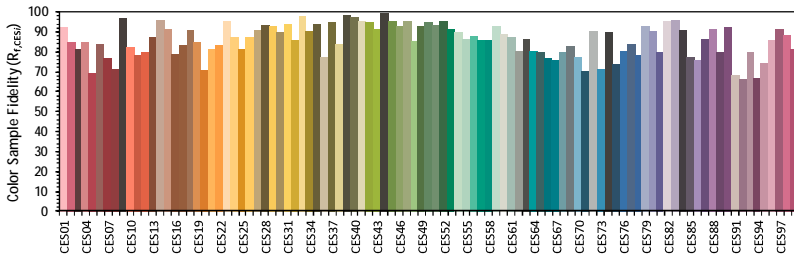
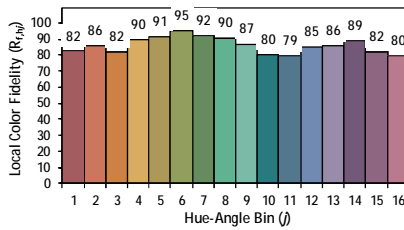
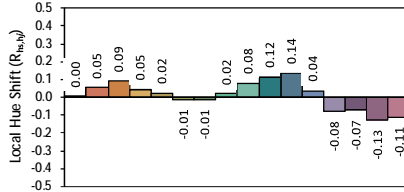
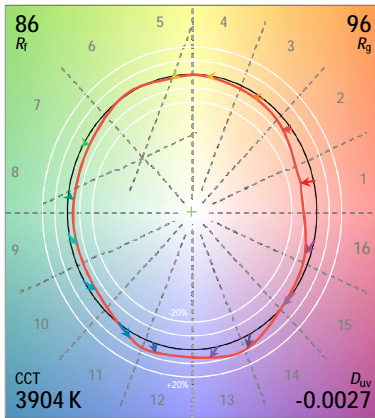
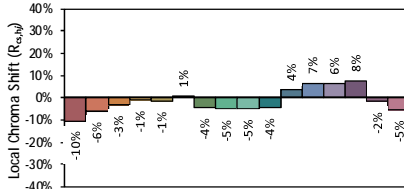
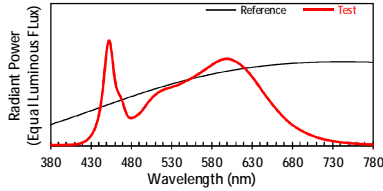
**Notes:** This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  0.4041  
 $y$  0.3816  
 $u'$  0.2387  
 $v'$  0.5072

### ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD  
Date: 2022/5/7

Manufacturer: ETI Solid State Lighting (Zhuhai) Ltd  
Model: 559041110(4000K)



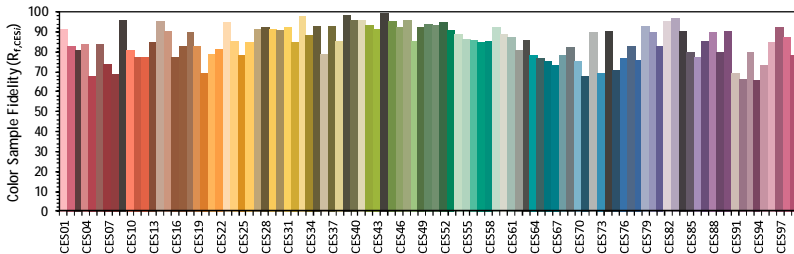
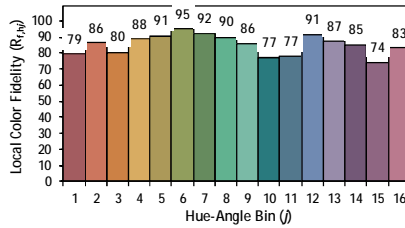
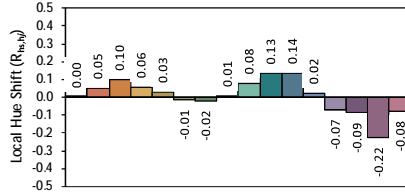
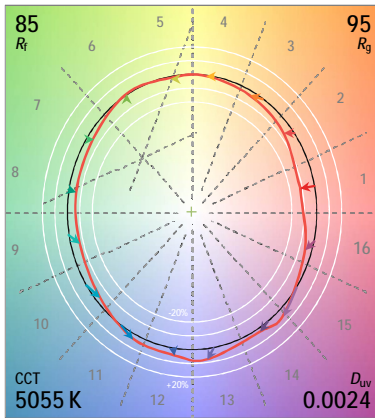
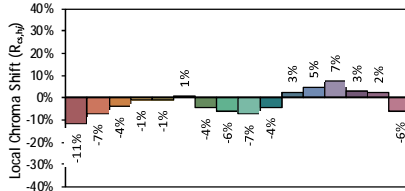
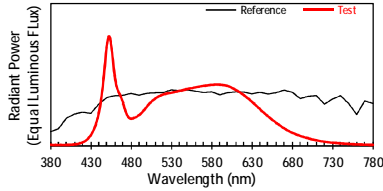
Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3828  
y 0.3725  
u' 0.2284  
v' 0.5000

### ANSI/IES TM-30-18 Color Rendition Report

**Source:** User SPD  
**Date:** 2022/5/7

**Manufacturer:** ETI Solid State Lighting (Zhuhai) Ltd  
**Model:** 559041110(5000K)



**Notes:** This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  0.3440  
 $y$  0.3555  
 $u'$  0.2092  
 $v'$  0.4864

**Note:**

Colors are for visual orientation purposes only. Created with the IES TM-30-18 Calculator Version 2.00.



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**4.3 Goniometry Test Data of 3000K**

CIE Type	Direct	Basic Luminous Shape	Rectangular
Spacing Criteria (0-180)	1.28	Luminous Length	1.16 m
Spacing Criteria (90-270)	1.28	Luminous Width	0.56 m
Spacing Criteria (Diagonal)	1.40	Luminous Height	0.00 m
Test Distance	29.75 m		

**4.4 Zonal Lumen Summary of 3000K**

Zone	Lumens	%Lamp	%Fixt
0-20	799.41	12.40	12.40
0-30	1701.64	26.40	26.40
0-40	2796.63	43.40	43.40
0-60	4981.95	77.40	77.40
0-80	6260.16	97.20	97.20
0-90	6413.13	99.60	99.60
10-90	6206.56	96.40	96.40
20-40	1997.22	31.00	31.00
20-50	3141.71	48.80	48.80
40-70	2986.35	46.40	46.40
60-80	1278.21	19.90	19.90
70-80	477.18	7.40	7.40
80-90	152.97	2.40	2.40
90-110	13.95	0.20	0.20
90-120	16.36	0.30	0.30
90-130	18.67	0.30	0.30
90-150	22.56	0.40	0.40
90-180	25.71	0.40	0.40
110-180	11.76	0.20	0.20
0-180	6438.83	100.00	100.00

Total Luminaire Efficiency = 100.00%

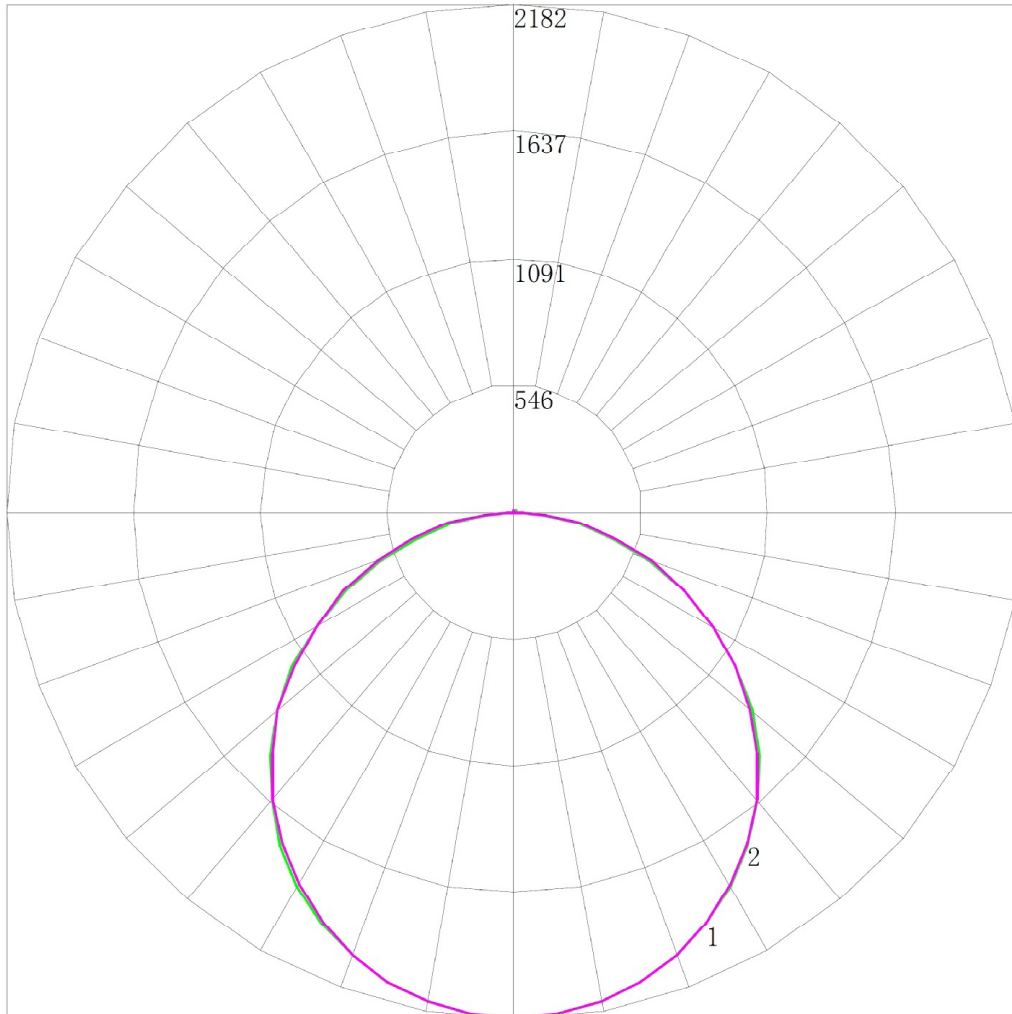
**ZONAL LUMEN SUMMARY**

Zone	Lumens
0-10	206.57
10-20	592.85
20-30	902.23
30-40	1094.99
40-50	1144.49
50-60	1040.82
60-70	801.04
70-80	477.18
80-90	152.97
90-100	10.80
100-110	3.15
110-120	2.41
120-130	2.31
130-140	2.00
140-150	1.89
150-160	1.67
160-170	1.10
170-180	0.38



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4.5 Polar Curves of 3000K



Maximum Candela = 2182.417 Located At Horizontal Angle = 0, Vertical Angle = 0  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



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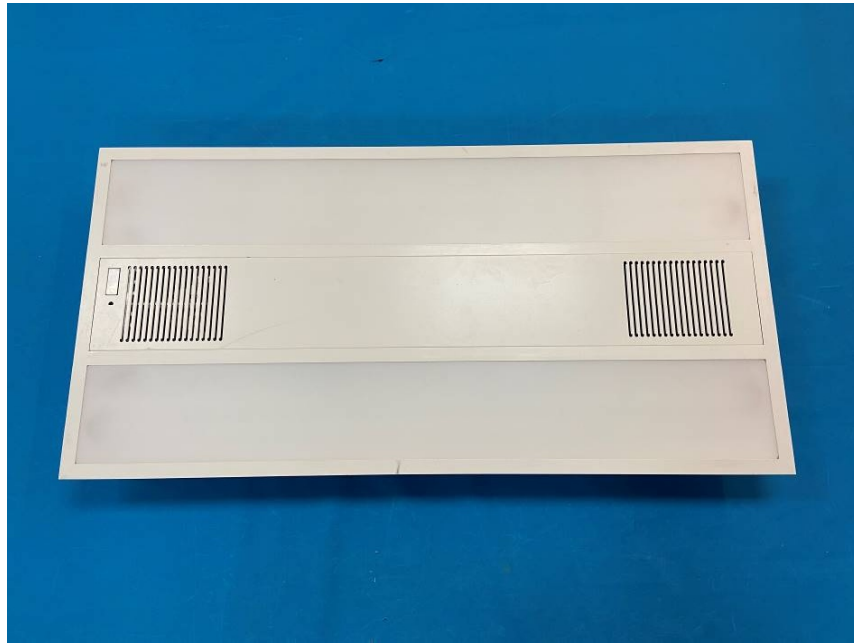
4.6 Candela Tabulation of 3000K

	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	2182.417	2182.417	2182.417	2182.417	2182.417	2182.417	2182.417
5	2173.563	2174.876	2173.550	2172.686	2174.011	2171.811	2173.620
10	2144.346	2147.589	2146.059	2143.933	2145.472	2143.967	2145.032
15	2100.964	2101.231	2101.050	2099.030	2100.565	2099.330	2099.729
20	2037.660	2038.895	2038.313	2036.428	2037.948	2035.464	2037.274
25	1957.535	1959.258	1957.610	1955.469	1956.531	1954.585	1953.707
30	1862.801	1864.318	1861.836	1860.793	1874.064	1856.463	1856.066
35	1750.803	1753.259	1752.630	1749.904	1749.992	1747.414	1746.329
40	1625.082	1628.240	1626.332	1623.576	1622.425	1619.048	1620.671
45	1485.372	1486.352	1487.480	1498.502	1482.118	1478.675	1478.827
50	1328.751	1332.375	1332.874	1327.515	1328.001	1324.316	1325.328
55	1164.871	1168.172	1167.593	1163.503	1164.125	1163.064	1160.437
60	988.949	992.613	1012.356	986.575	987.296	987.055	988.025
65	806.122	809.141	809.941	807.004	809.940	806.539	810.336
70	621.701	624.237	625.548	626.090	626.715	628.183	630.007
75	442.415	464.756	446.708	446.865	450.795	450.138	454.648
80	272.824	277.208	277.062	278.758	284.381	280.861	285.447
85	122.003	125.960	124.835	128.026	128.156	129.303	132.696
90	26.649	25.272	26.771	27.005	26.939	28.054	37.165
95	3.763	3.860	4.079	4.269	4.490	4.463	4.398
100	3.320	3.327	3.392	3.451	3.517	3.491	3.563
105	3.010	2.972	2.948	2.942	2.986	2.983	3.035
110	2.612	2.551	2.483	2.455	2.478	2.497	2.551
115	2.479	2.418	2.350	2.322	2.279	2.320	2.331
120	2.612	2.573	2.572	2.433	2.434	2.409	2.419
125	2.700	2.640	2.660	2.588	2.566	2.585	2.639
130	2.612	2.640	2.594	2.544	2.589	2.563	2.595
135	2.700	2.662	2.527	2.500	2.434	2.431	2.463
140	2.877	2.817	2.727	2.655	2.611	2.585	2.551
145	3.143	3.106	3.037	2.942	2.965	2.961	2.903
150	3.497	3.461	3.436	3.362	3.253	3.337	3.387
155	3.719	3.771	3.769	3.694	3.628	3.558	3.607
160	3.763	3.816	3.791	3.761	3.717	3.668	3.695
165	3.940	3.927	3.858	3.871	3.828	3.779	3.826
170	4.117	4.148	4.079	4.115	4.027	4.044	4.134
175	4.383	4.348	4.367	4.314	4.403	4.398	4.398
180	2.253	2.253	2.253	2.253	2.253	2.253	2.253



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**Appendix A Product Photo**



Picture 1



Picture 2

\*\*\*\*End of test report\*\*\*\*